



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification<sup>4</sup> :</b>  <b>A01N 25/34</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 89/ 05093</b>  <b>(43) International Publication Date:</b> 15 June 1989 (15.06.89)
<b>(21) International Application Number:</b> PCT/GB88/01001 <b>(22) International Filing Date:</b> 15 November 1988 (15.11.88)  <b>(31) Priority Application Numbers:</b> 8727915 8819739.7 <b>(32) Priority Dates:</b> 28 November 1987 (28.11.87) 19 August 1988 (19.08.88) <b>(33) Priority Country:</b> GB  <b>(71) Applicant (for all designated States except US):</b> FIBRE TREATMENTS (HOLDINGS) LIMITED [GB/GB]; Smallshaw Industrial Estate, Accrington Road, Burnley, Lancashire BB11 5SR (GB).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only) :</b> FELLOWS, Adrian, Neville [GB/GB]; 1 Slater Bank, Hebden Bridge, West Yorkshire HX7 7DY (GB).		<b>(74) Agent:</b> BRAY, Lilian, Janet; L.J. Bray & Co., Raw Holme, Midgehole Road, Hebden Bridge, West Yorkshire HX7 7AF (GB).  <b>(81) Designated States:</b> AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> A WIPING PRODUCT  <b>(57) Abstract</b>  <p>The present invention relates primarily to a product for use in the disinfection of hard surfaces, instruments and human or animal skin. The product comprises a lofted non-woven substrate having entrapped within its structure solid particles of a chlorine release agent which, when dampened with a suitable liquid, become active. Preferably, the chlorine release agent comprises sodium dichloroisocyanurate, which becomes active when dampened with water. An indicator, such as a dye, which is acted on by the activated particles is also preferably incorporated in the substrate to give an indication of the status of the product with regard to the exhaustion of the particles therefrom. Apart from use as a wipe, the product can also be used as a sheet inclusion in processes such as a washing process for the quantitative release of the chlorine for the purpose of disinfection or bleaching.</p>		

***FOR THE PURPOSES OF INFORMATION ONLY***

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	ML	Mali
AU	Australia	GA	Gabon	MR	Mauritania
BB	Barbados	GB	United Kingdom	MW	Malawi
BE	Belgium	HU	Hungary	NL	Netherlands
BG	Bulgaria	IT	Italy	NO	Norway
BJ	Benin	JP	Japan	RO	Romania
BR	Brazil	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	LI	Liechtenstein	SN	Senegal
CH	Switzerland	LK	Sri Lanka	SU	Soviet Union
CM	Cameroon	LU	Luxembourg	TD	Chad
DE	Germany, Federal Republic of	MC	Monaco	TG	Togo
DK	Denmark	MG	Madagascar	US	United States of America
FI	Finland				

A WIPING PRODUCT

The present invention relates primarily to a wiping product suitable for use in the disinfection of hard surfaces, instruments and human or animal skin.

Normally, such disinfection is accomplished by applying a disinfectant chemical or formulation to the surface, instrument or skin and accompanying this by spreading the disinfectant using a wiping material to ensure uniform coverage and therefore disinfection. To facilitate this, there have been developed wiping products comprising cloths, sponges, pads or other substrate materials which are either impregnated with disinfectant or retain a disinfecting agent within one or more pockets formed in the substrate material. These products are usually either pre-moistened in their packaging or require to be dampened before use. For example, United States Patent Specification No. 4,259,383 describes a tissue incorporating a disinfecting agent capable of generating hydrogen peroxide when wet. In a first example given in this specification, the disinfecting agent is sealed within a single pocket made between two layers of adsorbent non-woven paper and, in a second example, the disinfecting agent is sealed within a series of rhomboidally shaped pockets uniformly distributed over the length of the paper tissue. However, such products have a number of drawbacks and limitations in their use. In particular, the disinfectants that it is practical to use to impregnate such wipes have hitherto been limited and those used have not had a sufficient spectrum of activity, that is the ability to kill quickly and efficiently the more resistant micro-organisms such as Mycobacterium tuberculosis, Hepatitis B virus, Parvovirus, or Polio virus. With

particular reference to the surface test results given in Example 1 of the aforementioned U.S. Patent Specification, it is insufficient in many practical applications of a disinfecting wipe for the killing time for various micro-organisms to be of the order of one hour.

In order to kill the afore-mentioned micro-organisms, it is necessary to use a "high level" or "intermediate" disinfectant, such as chlorine or a chlorine releasing compound, but using conventional methods of impregnation or coating it is not possible to treat a wiping substrate with a chlorine containing chemical and attain a stable and an effective product. Owing to their lack of stability, the application of chlorine donor disinfectants in an aqueous solution or dispersion is not feasible. The same applies to many other disinfectants with a wide spectrum of activity. However, were it not for this lack of stability, chlorine, which is an effective hard surface disinfectant as it is of wide spectrum, is fast acting and does not leave a sticky or smearing residue, would be an excellent agent for inclusion in a wiping product.

The object of the present invention is primarily to provide a product suitable for use as a disinfecting wipe which overcomes the afore-mentioned disadvantage and which has a useful shelf-life.

In addition, one further disadvantage of wipes or tissues such as are described in the aforementioned U.S. Patent Specification wherein an active disinfecting agent is sealed within one or more pockets formed between layers of the tissue is that the disinfecting agent tends to accumulate at the

bottom of the pockets during storage and is not, therefore, uniformly distributed throughout the tissue. The disinfecting ability of the tissue can, as a result, be impaired. It is a further object of the present invention to overcome this disadvantage.

According to the present invention there is provided a product comprising a non-woven substrate having entrapped within its structure solid particles which, when dampened with a suitable liquid, become active and characterised in that the non-woven substrate has been lofted to form a matrix of fibres and in that the solid particles comprise a chlorine release agent and are substantially uniformly distributed throughout and entrapped within the matrix by the fibres forming the substrate.

Preferably, the chlorine release agent becomes active when dampened with water.

The chlorine release agent may, for example, comprise one or more of the following chemicals: calcium hypochlorite; chlorinated tri-sodium phosphate; N,N dichlorazo-dicarbonamidine; sodium p toluene sulphon-chloramide; p toluene sulphon-dichloramide; sodium benzene sulphonchloramide; succinchlorimide; p-sulphon-dichloramidobenzoic acid; 1,3 dichloro-5-5 diethyl hydantoin; trichloroisocyanuric acid; sodium dichloroisocyanurate; sodium dichloroisocyanurate dihydrate; potassium dichloroisocyanurate; or trichloromelamine. In addition, other chlorine release agents can be used which are either solid or which may be rendered as powders or granules by adsorption on to a suitable carrier.

Additionally, a chlorine release agent may be used in combination with other compounds such as a detergent, for example sodium alkylbenzene sulphonate, or sodium lauryl sulphate, or a detergent builder, for example sodium carbonate, sodium metasilicate, or sodium sulphate. Other compounds which may be used in this way include superabsorbent polymers, fragrances, perfumes or dyes.

If the product is to be used as a wipe for disinfecting surfaces, then a dye may be incorporated into the substrate so that it is bleached by the activated particles and thereby provides a visual indication of the status of the product with regard to the exhaustion of the product's disinfecting properties.

Preferably, the loftable nonwoven substrate is laminated on one or on both sides with another material through which the solid particles are unable to pass.

This laminate material may, for example, comprise either a nonwoven or a textile material, or paper, or a sponge material, or a plastics film depending on the use for which the product is designed. In some cases, it may be preferable for the laminate material to be hydrophobic and impermeable or alternatively a high water absorption may be desirable.

It will be appreciated that although the major purpose of this invention is to provide a product suitable for wiping and disinfecting surfaces, it is possible to utilise a product of similar physical characteristics for other purposes. For example, it could be used as a sheet inclusion in a washing

process for the quantitative release of chlorine either for the purpose of disinfection or bleaching.

5 The present invention will now be described in more detail by means of the following three examples.

10 In all of the examples, the loftable non-woven substrate employed is a non-woven fabric comprising a carded web of fibres bonded together with a thermoplastic material, which, when heated to the softening point of the binding material, will transform into a high loft, even density structure. The loftable nature of the fabric is achieved by the use of crimped fibres which are held in a compact form by the thermoplastic bonding material, usually a low temperature adhesive polymer, and which on heating of the fabric to soften the bonding material spring apart to form an even density matrix. Different textile fibres can be used but preferred fibres are polyester or viscose or combinations of polyester with viscose or other cellulosic fibre. Such substrates are available commercially under the trade name ULTRALOFT. However, any non-woven material capable of trapping solid particles could be used as the substrate of the product.

25 In a first example, the substrate comprises a 48 grams per square metre polyester bonded material which is laminated with a 24 grams per square metre polyester dry lay non-woven material. The combined material is firstly passed beneath a medium wave infra-red heater in order to loft the substrate layer and then subjected to a uniform scattering of particulate sodium dichloroisocyanurate dihydrate over the lofted substrate. Preferably, the particles are of a size within the range of 200 - 750 microns inclusive

so that they penetrate the substrate to give an available chlorine content of 5,000 ppm when activated by absorption of the product's maximum level of water.

5           The second example utilises a substrate comprising a 40 gram per square metre rayon fibre nonwoven material bonded by a polyester thermoplastic. This substrate is laminated with a 24 gram per square  
10       metre polyester dry-lay nonwoven material. As in the first example, the substrate is lofted by infra-red heat but the substrate is then stretched by passing it over a bowed roller in order to increase temporarily the openness of the substrate's structure. During this stretching, the substrate is subjected to a uniform  
15       scattering of a powder formulation comprising 95% sodium dichloroisocyanurate dihydrate and 5% sodium alkyl benzene sulphonate. The powder penetrates the stretched substrate and is then trapped when the stretching ceases and the substrate is relaxed.  
20       Sufficient powder penetrates the substrate in this example to give an available chlorine content of 1,000 ppm when activated by absorption of the product's maximum water level.

25           In a third example, the substrate comprises a 108 gram per square metre 100% polyester material which is again lofted by medium wave infra-red heat. A powder composition comprising sodium dichloroisocyanurate dihydrate together with a proportion of a  
30       superabsorbent polymer, such as is commercially available under the trade mark SALSORB of Allied Colloids PLC, is then rolled into the substrate so that penetration of the lofted substrate by the powder occurs. Sufficient powder penetration can be achieved  
35       to give an available chlorine content of 100 ppm when the product has absorbed its maximum level of water.



These examples serve to describe the invention more clearly. They should not be construed as qualitatively or quantitatively limiting the scope of the invention. It is, for example, readily possible to  
5 achieve available chlorine contents in excess of 5000 ppm.

It will be appreciated that in all the above examples a quantitatively measurable amount of the  
10 chlorine release agent is trapped in the matrix formed by the lofted substrate. This amount can be varied over a wide range to enable the finished wiping product to function as a sanitiser at one end of the range or as a heavy duty disinfecting product at the  
15 other end of the range.

The integrity of the finished product, particularly with regard to the firmness of inclusion of the applied solid particulate formulation, may be  
20 further influenced by a partial resealing or compacting of the lofted substrate. This may be achieved by pressure or by a combination of heat and pressure, for example by a suitable arrangement of nip rollers.

25

In use, if the product is to be used as a wipe for disinfecting surfaces then it is advantageous if a visual indicator is incorporated into the wipe to show the status of the disinfecting capability of the wipe  
30 at any given time. Such a visual indicator can be incorporated into the product by dyeing all or portions of the substrate with a dye which is bleached at a known rate by the chlorine released once the wipe is used. Preferably, the indicator dye gradually fades  
35 or disappears from the substrate at a similar rate to the rate at which the proportion of unreleased

chlorine within the wipe decreases during use.

If the substrate material employed in the product incorporates cellulosic fibres, suitable dyes have been found amongst those capable of dyeing cellulosic fibres, for example amongst the so-called "reactive dyes". Such dyes are marketed by ICI plc under its trade mark PROCION, Ciba Geigy plc under its trade mark CIBACRON, and Sandoz plc under its trade mark DRIMARENE. Of these, the dyes which have been found to be particularly useful are PROCION yellow MX-8G, PROCION red MX-5b, PROCION red HE-3B, and PROCION navy MX-4RD.

It has also been found possible to combine dyes, which are bleached by the chlorine released by the product, with other dyes, which are totally resistant to chlorine bleaching, to produce colour changes or colour disappearances which can also be used to signal the effective chlorine level available in the product. These other chlorine resistant dyes can be other forms of reactive dye or other types of cellulose dyes.

In practice, the substrate used in the product of the invention is dyed with one or more stripes of the dye or dyes before being lofted and impregnated with the chlorine releasing particles. The dyeing process can, therefore, form a stage in the production process of the product, as described in the above examples, and the use of cold acting reactive dyes is advantageous in this regard.

CLAIMS

1. A product comprising a nonwoven substrate having entrapped within its structure solid particles which, when dampened with a suitable liquid, become active and characterised in that the nonwoven substrate has been lofted to form a matrix of fibres and in that the solid particles comprise a chlorine release agent and are substantially uniformly distributed throughout and entrapped within the matrix by the fibres forming the substrate.
2. A product as claimed in Claim 1, characterised in that chlorine release agent becomes active when dampened with water.
3. A product as claimed in Claim 1 or Claim 2, characterised in that the chlorine release agent comprises one or more of the following chemicals: calcium hypochlorite; chlorinated tri-sodium phosphate; N,N dichlorazo-dicarbonamidine; sodium p toluene sulphon-dichloramide; p toluene sulphon-dichloramide; sodium benzene sulphonchloramide; succinchlorimide; p-sulphon-dichloramidobenzoic acid; 1,3 dichloro-5-5 diethyl hydantoin; trichloroisocyanuric acid; sodium dichloroisocyanurate; sodium dichloroisocyanurate dihydrate; potassium dichloroisocyanurate; trichloromelamine.
4. A product as claimed in any one of Claims 1 to 3, characterised in that the solid particles comprise a chlorine release agent in combination with a detergent or a detergent builder.
5. A product as claimed in any one of Claims 1 to 3, characterised in that the solid particles comprise a

chlorine release agent in combination with one or more of the following chemicals: sodium alkylbenzene sulphonate; sodium lauryl sulphate; sodium carbonate; sodium metasilicate; sodium sulphate.

5

6. A product as claimed in any one of Claims 1 to 5, characterised in that the particles are of a size within the range of 200 to 750 microns inclusive.

10

7. A product as claimed in any one of Claims 1 to 6, characterised in that the substrate is laminated on one or on both sides with another material through which the solid particles are unable to pass.

15

8. A product as claimed in any one of Claims 1 to 7, characterised in that an indicator is incorporated with the substrate, which indicator is affected by the activated particles to provide an indication of the status of the product with regard to the exhaustion of the particles therefrom.

20

9. A product as claimed in Claim 8, characterised in that the indicator is a dye which is bleached out by the chlorine when released from the particles to provide a visual indication of the status of the product.

25

10. A product as claimed in Claim 9, characterised in that the indicator is combined with a second dye which is resistant to chlorine bleaching so that there is a colour change in or a colour disappearance from the substrate when chlorine is released from the particles to provide the visual indication of the status of the product.

30

35

11. A product as claimed in any one of Claims 1 to

10, characterised in that the substrate has been at least partially sealed after entrapment of the solid particles therein either by the application of pressure thereto or by a combination of the application of heat and pressure thereto.

12. A product as claimed in any one of Claims 1 to 11, characterised in that the substrate comprises a web of fibres bonded together with a thermoplastic material, the fibres comprising either polyester fibres or cellulosic fibres or a combination of polyester and cellulosic fibres.

15

# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 88/01001

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC4: A 01 N 25/34

## II. FIELDS SEARCHED

Minimum Documentation Searched \*

Classification System \*

Classification Symbols

IPC4

A 01 N

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

## III. DOCUMENTS CONSIDERED TO BE RELEVANT \*

Category *	Citation of Document, ** with Indication, where appropriate, of the relevant passages **	Relevant to Claim No. **
X	EP, A2, 0 103 214 (KANEBO LTD) 21 March 1984, see claims --	1
X	EP, A2, 0 080 330 (STANDARD TELEPHONES AND CABLES PUBLIC LIMITED COMPANY) 1 June 1983, see claims 1,2,9, page 3, lines 25-27, page 7, lines 8-9 --	1
X	EP, A2, 0 110 678 (UNILEVER NV) 13 June 1984, see claims 1,2, page 1, lines 4-13, page 7, line 16, page 8, lines 7-17 --	1
X	WO, A1, 8701400 (JAMES RIVER CORPORATION) 12 March 1987, see claims 1-7, 19-25 --	1

\* Special categories of cited documents: \*\*

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

## IV. CERTIFICATION

Date of the Actual Completion of the International Search

2nd February 1989

Date of Mailing of this International Search Report

27 FEB 1989

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

 P.C.G. VAN DER PUTTEN

## III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category*	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
X	WO, A1, 8502422 (AVTEX FIBERS INC.) 6 June 1985, see page 18, line 17, page 19, lines 30-33, claim 1 --	1
X	DE, A1, 28 41 749 (EXTERMA-GERM PRODUCTS LTD.) 5 April 1979, see claims --	1
A	DE, B, 963 192 (VEREINIGTE DEUTSCHE METALLWERKE A.G.) 2 May 1957, see claims 1, 3 --	1-3
A	US, A, 3 873 685 (W.H. KIBBEL JR. ET AL.) 25 March 1975, see column 1, lines 7-19, claims -- -----	1-3

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO. PCT/GB 88/01001**

SA 25265

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office (EPO) file on 12/01/89.  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A3- 0 103 214	21/03/84	JP-A- 59037956	01/03/84
		US-A- 4525410	25/06/85
		CA-A- 1225584	18/08/87
EP-A2- 0 080 330	01/06/83	GB-A-B- 2109237	02/06/83
		AU-D- 90472/82	26/05/83
		GB-A- 2111388	06/07/83
		US-A- 4517006	14/05/85
		AU-A- 558046	15/01/87
EP-A2- 0 110 678	13/06/84	AU-D- 21628/83	31/05/84
		JP-A- 59108039	22/06/84
		GB-A-B- 2133407	25/07/84
		US-A- 4473611	25/09/84
		AU-A- 555588	02/10/86
WO-A1- 8701400	12/03/87	CA-A- 1222097	19/05/87
		US-A- 4615937	07/10/86
		EP-A- 0233943	02/09/87
		US-A- 4692374	08/09/87
		JP-T- 63501226	12/05/88
WO-A1- 8502422	06/06/85	AU-D- 33912/84	13/06/85
		EP-A- 0163653	11/12/85
		JP-T- 61500500	20/03/86
DE-A1- 28 41 749	05/04/79	BE-A- 870799	15/01/79
		LU-A- 80279	16/03/79
		NL-A- 7809740	29/03/79
		FR-A-B- 2404067	20/04/79
		GB-A-B- 2007096	16/05/79
		JP-A- 54055677	02/05/79
		AU-D- 40014/78	27/03/80
		CH-A-B- 628198	26/02/82
		CA-A- 1131116	07/09/82
		AU-A- 527441	03/03/83
		SE-A- 7810087	28/03/79
		SE-A-C- 430797	12/12/83
DE-B- 963 192	02/05/57	NONE	
US-A- 3 873 685	25/03/75	NL-A- 7411927	12/03/75
		BE-A- 819710	10/03/75
		FR-A-B- 2243156	04/04/75
		DE-A- 2443000	20/03/75

EPO FORM 1087



## PCT/C886/01001

SA 25265

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office (EPO) file on 12/01/89. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3 873 685	25/03/75	GB-A- 1436305	19/05/76
		AT-A- 338704	12/09/77
		CA-A- 1033662	27/06/78
		JP-A- 50064194	31/05/75
		SE-A- 419933	07/09/81
<hr/>			

[illegible]

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82.